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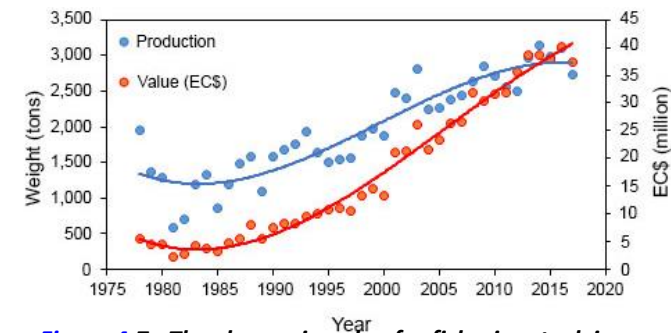
# Chapter 4 Ecosystem and Genetic Values

**TOWARDS THE VALUATION OF THE GENETIC AND ECOSYSTEM RESOURCES WITHIN  
GRENADA**

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# Chapter Summary – Marine Ecosystems and Genetic resources

- Marine Capture Fisheries in the 1978-2017 period  
US\$690 Million in harvests
  - Yellowfin Tuna , Spiny lobster, Lambi, Sport fishing
- Special species – Sea Urchins, Marine Turtles
- Marine Natural Products and bioactive compounds – 2,500 species with potential
- Grenada has already 11 natural products from marine organisms
  - A marine cyanobacterium, *Lyngbya majuscula*.
  - Fatty acid amides were isolated from *L. majuscula*, and converted into a biofertilizer called Grenamides.



**Figure 4.7.** The change in value for fisheries stock in Grenada for the period 1978-2017. (Data from Fisheries Division 2021).

# Chapter Summary – Marine Ecosystems and Genetic resources

- Coral Reefs EC\$ 1.3 Billion in costal protection services
  - EC1.3 M annually in costal protection services
  - US\$ 20 M annual in tourism associated values
- Mangroves - US\$ 3,764,334 million in service values annually
  - Primary in costal protection and carbon sequestration services, but also fisheries
  - Restoration cost of US\$14,000 per Hectare ( Compared to US\$ 3.6 m TO 17.8 M per hectare of seawalls and breakwaters respectively)
- Seagrasses – Understudied but important for carbon sequestration, costal protection and Fisheries
- Marine protected areas
  - Sandy Island Oyster Bed Marine Protected area located on the southwest coast of Carriacou
  - Net benefits generated are estimated to be between EC\$ 2.9 and 6.8 million



# Chapter Summary - Freshwater resources

- Important Instrumental (and relational) Values
  - Titree Seasonal Values of up to 3000 EC per producer. Crayfish, Canac dos shrimp, Land Crabs, cascadura, Aquaria Trade, Water foul
- Watershed services and Water supply
  - Annual net benefit of water production in Grand Etang in 2010 was EC\$ 3,266,445
- Upscaled estimates of in EC\$ 64,825,047.84 of value per year generated by natural water resources
- Rainwater harvesting in Carriacou and Petit Martinique



# Chapter Summary – Terrestrial/Forest resources

- Timber
  - Small but important role in local construction, furniture and boatbuilding industries ( Generating direct and indirect employment and benefits
  - Roundwood and fuel wood – Daily income for loggers of approx. EC\$ 378 Per Day
- Non-Timber Forest products
  - Important role in local handicrafts industry and indirect tourism benefits ( donkey eye, coconut leaves, calabash etc)
- Wild meat and Game
  - Manicou, Iguana, Tatoo, Scaly-naped Pigeons, Mona Monkey
  - Small market but important relational value particularly and local gathering and special events.
  - Risks to local ‘Hybrid’ Iguana Species due to hunting pressure and habitat change
  - Loss of value due to smuggling and illegal trade
- Medicinal Plants
  - Aprox 80% of population uses ‘bush medicine’



# Chapter Summary – Terrestrial/Forest resources

- Terrestrial resources play an important role in Ecotourism and Recreation
- Direct income through user (entrance) fees, and tour guide fees
  - Gran Etang 3,263 local visitors in 2011.
  - Indirect income through transportation to these local sites very important but poorly understood
  - Hiking and forest recreation becoming more important for local Grenadians and their relationships with nature
- Carbon Sequestration, further estimates of value provided by terrestrial forests to be developed in final version of chapter.
  - Net Carbon Fixation benefits of EC\$ 237,924 per year at Gran Etang

# Chapter Summary Agro-ecosystems

- Major crops account for 47% of total exports and employs 13.8% of the Labour force
- Grenada is the “Spice Isle’ and agriculture related to spices is thus an important Instrumental and Relational Value
  - Nutmeg and other Spices
  - Average exports of EC\$21 M (nutmeg) and EC\$ 14 M (Mace) annually
  - Value added food and cosmetics, less important but have high potential for development
- Coca - Important raw material and value-added products, with global recognition
  - Average EC\$ 5 M in coca sales EC\$ 3 Million in Chocolate sales, 32,000 Visitors to agro-tourism sites
- Fruit trees – Limited exports of mangoes, but increasing
  - Recognition of the high value of local varieties due to unique features such as taste



# Chapter Summary Agro-ecosystems

- Soursop- Emergent sector with high levels of Economic importance\
  - One of the few exporters to the US
  - EC\$ 7.2 Million in 2017 up from EC\$ .28 M in 2012
  - What other products have this potential?
- Carbon sequestration by major crops
  - Nutmeg generates up to 200,00 per year in CO2 sequestration values
- Backyard farming Important relational but also instrumental value for those employed in volatile industries
  - Important for the production of value-added products for income
  - Kitchen gardens and provision grounds
    - Breadfruit, mango, avocado, coconut, plantain banana, sapodilla and citrus are important for national but also personal nutrition and food security. Corn particularly important in Cariaccou.
    - Provision grounds, dasheen grounds, tannia, yam and cassva
- Poultry and Livestock
  - Local poultry – 12% of demand supplied locally
  - Goats and sheep – What role do they play?



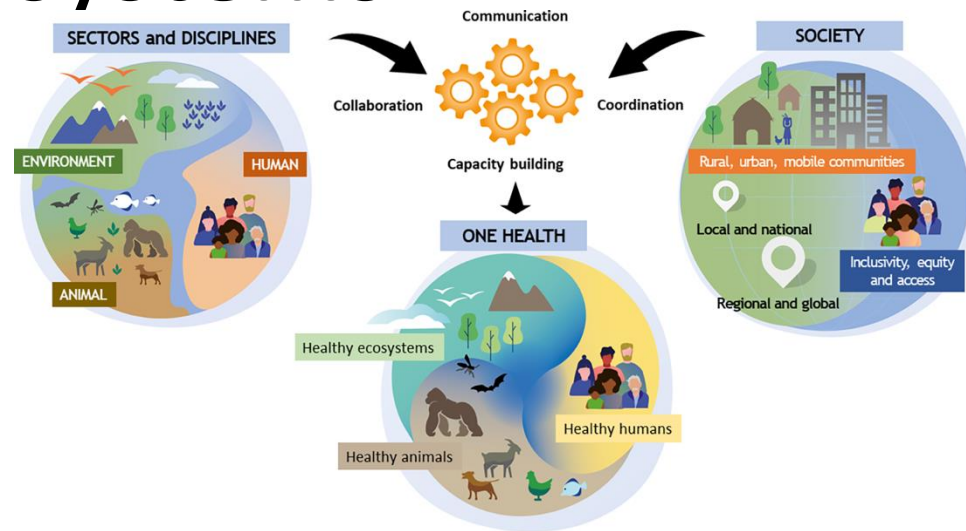
# Chapter Summary Agro-ecosystems

- Poultry and Livestock
  - Local poultry – 12% of demand supplied locally
  - Goats and sheep – What role do they play?
- Apiculture - World famous honey reflective of Bee diversity but also diversity of pollen sources in Ecosystem
  - Unique mix of Grenadian pollen cannot be re-created
  - Aprox 1400 Beehives
- A single hive can produce US\$ 1664 per annum in honey products
  - Essential to production if pumplings squashes and cucumbers

Food type	Demand met by local production (%)
Fruits	93
Vegetables including carrots	50
Eggs	100
Poultry	~13 -25
Roots and tubers, including white potatoes	30
Herbs	95
Pork (fresh)	75
Lamb (fresh)	10
Beef and beef products	5

# Chapter Summary Human Health and ecosystems

- There is an inextricable link between ecosystem health and human and animal health and wellbeing.
- As recognition of this link, the fairly recent field of ecohealth has emerged which dedicates itself to studying how changes in earth's various ecosystems are impacting human and animal health (Charron, 2012).
- The One Health paradigm builds on the ecohealth concept as well as Planetary Health by emphasizing a more ecocentric worldview as being necessary in order to secure health and wellbeing for all lifeforms on this planet.



# Chapter Summary - Key emerging issues and Recommendations for Policymakers

- Conservation, wise use and benefit sharing
- Bioprospecting of genetic resources have numerous values
  - Future direct revenue, Development of New drugs, contribution to food security
- Microbial Genetic Diversity

# Chapter Summary - Recommendations for Policymakers

- Natural Capital Accounting
- Payment for Ecosystem Services Approaches
- NCP and stakeholder engagement
- Green and Blue bonds
- Policy recommendations related to genetic resources

# END of Chapter summary



# Marine Ecosystems

- Of Grenada's marine resources which are the most valuable to you?
- Of these values which are you most worried about losing in the future?
- Of these values which would you like to preserve as a priority for your well being?

# Freshwater resources

- Of Grenada's fresh water resources which are most valuable to you?
- Of these values which are you most worried about losing in the future?
- Of these values which would you like to preserve as a priority



# Terrestrial resources- Questions

- Of Grenada's terrestrial resources which are most valuable to you?
- can you think of any examples of plants or animals that have value outside those mentioned so far?
- Of these values which would you like to preserve as a priority?

# Agro-ecosystems questions

- What is the value to you of agro-ecosystems (including farms of nutmeg+other spices,cocoa, soursop+other fruits; backyard farming (or multi-story tree gardens), poultry+livestock rearing, managed bee-keeping?
- Can you think of any examples of plants or animals that have value outside of these groups?

# Other questions

- What do you think are some of the potential uses or emerging opportunities for Grenada's living resources at the level of genes? species level? ecosystem level?
- What do you think are some of the emerging issues at the level of genes or species? and at the level of ecosystems ?
- What recommendations would you suggest to Ministers/Policy Makers to safeguard Grenada's genetic resources and ecosystems?